RENEWABLES POLICY COMMITTEE COMMITTEE WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)	
	)	
The Design of the New Solar Homes Partnership	)	Docket No. 06-NSHP-1
	)	
	)	

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

MONDAY, JUNE 12, 2006

9:30 A.M.

Reported by:
Peter Petty
Contract No. 150-04-002

COMMISSIONERS PRESENT

John Geesman, Presiding Member

Jackalyne Pfannenstiel, Vice Chair and Associate Member

ADVISORS PRESENT

Melissa Jones

Tit Tutt

STAFF PRESENT

Bill Pennington

Smita Gupta

Sandy Miller

Elaine Hebert

CONSULTANTS TO STAFF

Bruce Wilcox, Berkeley Solar Group

Charles Eley, Eley Associates

STAFF CONTRACTORS

Thomas Hoff, Clean Power Research

ALSO PRESENT

Rob Hammon, ConSol

Juliette Anthony, Californians for Renewable Energy

ALSO PRESENT (Continued)

Bill Kelly, Powerlight

Mike Keesee, SMUD

Joseph McCabe, Energy Ideas/SMUD

Kirk Uhler, DRCI

Noah Horowitz, NRDC

Dick Lowry, Sharp Solar

Tom Hamilton, CHEEPS

I N D E X

P R O C E E D I N G S

9:30 a.m.

PRESIDING MEMBER GEESMAN: This is a workshop of the California Energy Commission Renewables Committee on the Design of our New Solar Homes Partnership. I am John Geesman, the Presiding Member of the Renewables Committee.

To my right is Commissioner Jackalyne Pfannenstiel, named on Friday as the new Chair of the Energy Commission. To my left, Melissa Jones, my staff advisor.

Commissioner Pfannenstiel has taken the lead in the development of the Energy Commission New Solar Homes Partnership, and I would like to turn the workshop over to her.

CHAIRPERSON PFANNENSTIEL: Thank you, Commissioner Geesman. This is an opportunity today, the first of what will probably be several opportunities to hear from the stakeholders on the design of the Solar Program.

I think everybody in the room is aware of the fact that the Solar Program is being restructured starting January 1 of next year into two segments. One segment that the Public Utilities Commission will be primarily responsible for establishing and administering. The other that the Energy Commission has the lead in.

We have designed or we are in the process of designing our program to affect a very specific market

segment. That is the segment that is new residential construction. Unless this sounds like a small segment, we know that in the last couple of years, there have been something like 200,000 homes built in California.

It is precisely those homes and precisely the fact that these homes are being built in the hottest central air conditioning areas of the state that have us seeing this as an opportunity to make a significant change by installing solar panels on those homes.

Having said that, the other equally important aspect of how we intend to influence the construction of these homes is that we are going to couple the solar applications with higher levels of energy sufficiency. We know and have said often that energy efficiency is the most effective way of reducing energy consumption of providing additional meeting resource needs and so this is an opportunity for us to bring the energy efficiency together with the solar applications. Accordingly, we believe to create a very effective and sustainable industry over the long run.

We brought this together in what we are calling a partnership, and the partnership aspect here is that it is the Energy Commission working, of course, with our colleagues at the Public Utilities Commission, but also working with the solar community and working with the

builder community.

The Energy Commission has a long history of working with home builders in California because of our responsibility under the Building Energy Efficiency Standards Title 24. We want to work with the builders to help develop this program, which is effective and sustainable.

We are at an early stage of the program development. The staff has put out a report that I believe you've all seen and we will talk more about in a minute. That is a starting point as far as we are concerned. There is an awful lot of information that we are still pulling in. There are parts of this Staff proposal, which I believe will be relatively uncontroversial as we go forward today.

There are other parts where people in the room today have a lot of information that we need to hear from, questions, concerns, issues, analysis, whatever it takes to help us develop a better program, one that we as a Commission will adopt later this year to implement the beginning of next year.

I think we should go right into the Staff proposal, and we are going to divide it into two parts. Tim Tutt, who is my advisor, will walk through one part of what is in the Staff proposal, and Bill Pennington and Smita Gupta will do the second part.

Why don't I turn it over to Tim.

MR. TUTT: Thank you, Chairperson Pfannenstiel. If I may, a few housekeeping items at the beginning. As most of you have been here before, you probably know that the restrooms are right outside here in the corner. If you are out there and have a temptation to leave the building by that door, please resist it because an alarm will go off. It shuts off pretty quickly, but it tends to disrupt the proceedings here a little bit.

The other thing that might disrupt the proceeding is cell phone calls. Please turn your cell phones off. Of course, there will be public comment at this workshop. If you wish to speak, please fill out a blue card and provide it to either Dianna Chong sitting at the table or to Jeff Wilson, and it will be brought up to the Commissioners to call on you when the time comes.

I am standing here doing this presentation for a particular reason. My colleague, Jeff Wilson, has taken another position and is leaving the Commission by the end of the month. It would be remiss of me to stand here today and go through this without giving due credit to Jeff for the hard work that he's done. We wouldn't be here today at this podium, I wouldn't be here and we wouldn't be here at this workshop without the many hours and the grand degree of thought that Jeff has put into this work as the Staff Lead

of the New Solar Homes Partnership. So, I just wanted to commend him and wish him good luck as he moves forward into his new life and new position.

In this presentation, I am going to give a little bit of a background, not much because we all here probably know pretty much what has been going on in California, what the background is. I am going to talk about the eligible new solar homes participants and technologies, incentive funding and structure, and the administrative procedures and structure that we plan to follow.

As Chairman Pfannenstiel suggested, there will be more detailed presentations to follow about the incentive structure, and particular the performance aspects of it, and about the analysis that goes behind the incentive structure that we developed.

In summary, we are in a transition as we mentioned. The baseline we have is the existing programs today. The Emerging Renewable Program here and the Self-Gen Program at the Public Utilities Commission.

These programs have accomplished a lot in California. As you can see by the chart, approximately 150 MWs of solar, distributed solar installed in California since 2000. The next generation, the CSI Program at the PUC and its component here, the New Solar Homes Partnership, aim to get 3000 MWs by 2016, a significant increase in solar in

California.

The New Solar Homes Partnership, the subject of this particular workshop, is going to cover as you probably know, but just to make sure that it is there, new residential buildings only. Production homes is the main focus and the main market of the program.

Affordable housing is another significant component and we will be talking about that incase you guys have missed the notice in a workshop tomorrow going through a significant amount of thought and public comment about affordable housing in both programs here and at the CPUC.

We also have multi-family apartments, which is perhaps somewhat different than production home buildings and custom homes, there won't be very many of presumably, but still will be part of the program.

We intend in this program to specifically target and work as Chairperson Pfannenstiel said, with the builders and the developers, affordable housing stakeholders, and the utilities to make it a true partnership.

The Commission's Integrated Energy Policy Report in 2005 provided some policy principles for developing a new solar program in California. In six of the nine policy principles are covered in the initial design of this program.

First, high performing systems resulting in cost

effective public funding. Second to target PV installations to climate zones with high peak demand for air condition where PVs will have the most benefit to the grid.

Third and fourth, to establish a performance-based incentive structure with long-term declining incentives, and one of the more important ones in our minds is to leverage energy efficiency improvements to integrate high energy efficiency and consider time-of-use energy in the program.

Finally, to incorporate PVs into the 2008 Building Energy Efficiency Standards. This last point, we were not incorporating PV has a mandate in the standards, but we are incorporating them as something that is integrated with structures of the standards. It is a topic that my colleague Bill Pennington will talk about in more detail later.

The other three IEPR policy principles we expect to phase into the final program, hopefully in the design stage, but in some cases, for example, advanced metering, we may have to phase in as the advanced metering phases in. We do expect to have advanced metering time variant pricing eventually a viable significant utility role and incorporation of solar thermal technologies in the program as expressed in the IEPR.

The eligible participants in technologies in the program, as I said, new homes in IOU service territories.

The three IOU service territories plus Bear Valley have participated in the program to date. We will hope to and will work with publicly-owned utilities to coordinate statewide, but they are participants without some coordination are not eligible for this particular funding source for this program.

Either the builder or the homeowner or the installer could get the incentive. We intend to set out an incentive, and we would like public comment as to whether there should be any restrictions or considerations about who gets it.

The technologies included in the program are photovoltaic, including tracking PV and concentrating PV are the main components of the program. We expect these technologies as in the past would have to be certified in some fashion, and we do expect that the certification process that we have employed in the past will be upgraded and again, Bill Pennington will talk about that in some detail later.

Tracking PV and concentrating PV shouldn't be a large portion of the program initially. They may grow as they do. We would have to have them certified and be able to work through the simulation model for the characteristics specific to those programs as they become part of the program.

Solar thermal electric generators, in the past, they have been eligible for the Emerging Program, there has been no participation. We are not sure about including them in this program or to continue to include them in the remaining part of the Emerging Program.

Solar thermal heating and cooling, again, is something we will be incorporating into the program as we figure out exactly what to do there. We would like public comment on that. There are some activities going on to try to understand that in more detail, but we are not ready to talk about any program proposal for them at this point.

Other eligibility requirements, obviously there needs to be a high level of energy efficiency, and I will get to that. We have had a concept of having a metering and rate design requirements in the program that was in the Staff proposal, and, again, we probably will have to be phasing those in as we haven't really fully decided how to incorporate advanced metering and rate design. Those processes are on their own tracks to some degree and have to be coordinated with this.

We have in the past had a metering requirement for the systems for a meter that the customer can read, and we will continue that and may alter that as we move forward into the new program.

We do expect high levels of energy efficiency as

we build these new solar homes. We know there are readily available to energy efficiency measures out there to go beyond Title 24. We feel like incorporating energy efficiency can lead to smaller and less expensive PV systems where it makes sense, and it will maximize the use of societal resources in those cases.

This incorporation honors the state loading order priority as it delivers energy efficiency and renewables at the same time. The lowest level under consideration under the program is 15 percent better than Title 24, the common Energy Star requirement for Energy Star Homes Programs in California. Much higher levels are under consideration, Building America often does 30 or 40 percent better than Title 24, and so we do feel like that is feasible and cost effective in many circumstances, and we are trying to understand what to require there.

Energy Star appliances and high efficacy lighting are part of the picture. I also like to say we are considering still a two-tier incentive where there is a minimum level requirements for energy efficiency to get the basic solar incentive than a higher incentive for much more significant levels of energy efficiency in your system or in your project.

The basic incentive structure we are looking at is an expected performance based incentive. As I said, a

probably enhanced incentive for higher energy efficiency. An expected performance based incentive is paid up front, but it is based very significantly on the performance, the expected performance of the system. Again, Bill Pennington has some data and some details on this and will show it to you later.

We also will be looking at affordable housing and on-going. In the current program, affordable housing has a 25 percent higher rebate than the standard rebate and has some energy efficiency requirements. There has been good participation, but we do want to increase the percentage participation for affordable housing, so we are trying to understanding with affordable housing stakeholders exactly how we design a program that makes sense for that structure to really get significant interest.

Again, solar thermal will happen later. We also expect to provide ancillary assistance to stakeholders in the form of training, recognition of significant participants of good practices, technical support, and a significant marketing and outreach program that establishes a good brand for solar in the state.

I will speak a little bit about PV performance issues. We have been dividing them into three categories. There is design and installation factors, which effect the performance of the system over time, but really are

determined as a system is installed. The location of the system, where in the state it is, the tilt, the orientation, site characteristics such as shading, the design of the system, how the modules interact with each other and the invertor. All of these are determined up front.

Then there is on-going normal performance factors that effect the performance of the system. They can get dirty if there is not much rain, if the consumer is not washing them off. Shading can change over time as trees grow or other things happen with your house or your neighbor's house. It will degrade at some rate over time and have slightly less performance year-to-year. There is significant weather variability from year to year.

Finally, there is some infrequent, but significant factors, invertor failure or fuses that fail or blow. It can cause the whole system to go down, but you don't expect it to happen on a regular basis.

The point of this slide is that our expected performance based incentive is targeted primarily at the first set of factors generally. That is the factors that can be affected when the designer, the installer, and the builder are right there working on how the system is going to be put together and perform over time.

We do expect that consumers and others will take care of the on-going normal performance factors, mother

nature with rain helps out with washing the dirt off at the times. I think for the infrequent, but significant factors such as invertor failure, we feel like a long-term performance based incentive could cover those, but it would have to be long term to really cover the timing of those kind of expected invertor failures.

A monitoring program might also cover them, monitoring and education program as you move forward and you understand that your system or somebody tells you that your system is no longer working.

Here is the proposed incentive level starting out at $2.25 a Watt in the year 2007 and decreasing 25 cents a Watt by 10 percent a year effectively. The 10 percent would be 23 cents a Watt, and I've kind of rounded these off here to 25 cents a Watt initially and 20 cents a Watt in the last five years just to be more consistent with percentages and give them more reasonable interpretation of incentive levels. It is sort of easier to say $2.25 than $2.09 for example.

That will lead presumably to these volume amounts and the annual budgets that you see here as up to about $300 million and 400 MWs, and these are based on the incentive analysis model that Tom Hoff has developed and will be presented later.

Trigger mechanism we are still considering a

volume and time trigger, so that the volume trigger would be enacted when a certain number of MWs of confirmed reservations come into the house. We will insure the budget for our goal and provides an automatic reaction to market growth.

We anticipate learning from experience earlier this year to include a one-month lag in this trigger for market notice. In other words, when we think we are getting to the volume trigger, the MWs for the next an incentive drop will happen one month after we get there or some other way of establishing market notice that this is about to happen.

The time trigger. Currently our program drops rebates automatically every six months. The structure I presented in the previous slides suggest it every year. We could divide the rebate levels in half and do it every six months still to have a little bit less of a change from time to time. The advantage is including this type of trigger is it provides some market pole in slow periods.

We have learned in the current program that when that rebate level drops, you get a significant spike in interest in the program. It also insures to some degree the timing for the goal. We anticipate this to be a sustained ten-year program and the volume trigger addresses that time frame.

We continue to believe that we should have adjustment flexibility to react to market conditions that we see.

Those last two slides, you won't find much in the staff report on that information. Those have been developed recently based the work that we have had Tom Hoff working on us for us, so I wanted to make sure that you are aware of those in this meeting and to be able to provide comment on what we are thinking of doing.

Again, ancillary assistance. We are going to be developing guidelines and technical support for builders and installers training programs and video for builders and installers, HERS raters, building inspectors, and so forth. We want to establish a strong branding campaign, an outreach program to help achieve our goals. We do feel like we need some basic market research to get what really will work in California, not just a willingness to pay analysis, but some understanding of what will really drive the consumer to understand the benefits of solar for them in the long run.

The specifications, we do expect to continue of a first come/first serve program with a 24 month reservation period as opposed to the current 9 to 18 months. It is a longer reservation period, it is more consistent with the builder time frame. A new thing for our proposal next year is that we do want to piggy back on the process that is

established for new production homes already, to have third-party inspections for some of the energy efficiency installations in a building or a new home. We will hope to piggy back on that HERS rater or Home Energy Rating System structure to have field verification prior to payment for the solar systems as well. Again, Bill Pennington will be talking about this in more detail.

We do expect their is significant benefits to having strong coordination with advanced metering infrastructure, and we will roll that into the program, but as you probably all are aware, the advanced metering roll out is not proceeding as fast as expected, and we have a bit more time perhaps to consider exactly how that becomes part of the program.

We do want and suggest that we will contract out the basic administrative function of this program. The processing of reservations and the checking and sending back of a confirmed reservation and so on, and we certainly will consider a variety of entities that might be a feasible entity for taking on that function including the investor-owned utilities as called out in the staff report.

We do expect to include periodic evaluations of the program to understand how it is going, what we need to change, what we need to do to make it better.

In summary, the benefits to California we feel of

this program is that we will some new tools available, the incentives, the calculation tool, and the protocols will motivate and enable builders to deliver really high performing PV systems that have a significant energy efficiency component in the houses that are constructed.

The information and the process that we are developing is a direct extension of the current Title 24 infrastructure, so it fits right in with the builder process and extends it to clean distributed generation in the form of renewable photovoltaic.

We have an expected performance based system that provides the builders with up front rebates where, again, the real meat of establishing what the performance characteristics of the system occur. There will be a priority in the program on sunnier hotter climates where building starts are concentrated where peak demand is greater and where impacts on system reliability are the most severe.

Finally, this meets the Commission's objectives for photovoltaic in combination with high-energy efficiency, and we think it is a good start to developing a sustainable new home solar industry in California.

With that, I think Chairperson Pfannenstiel, we should probably have the other presentations and take any comments and questions later.

CHAIRPERSON PFANNENSTIEL: Yes, Bill and Smita.

MR. PENNINGTON: Thank you very much, Chairperson Pfannenstiel, Commissioner Geesman. My name is Bill Pennington, and I am the Manager of the Buildings and Appliances Office at the Energy Commission. Primarily what our office does is develop and implement the standards programs at the Energy Commission.

This program, the New Solar Homes Partnership Program is focused primarily on our customer base if you will for the standards program. We have been working with the building industry in trying to accomplish highly energy efficient buildings for 25 years now, and we have developed a lot of techniques for how to approach that that are basic to the infrastructure for building homes these days. What we are trying to do is extend that to the New Solar Homes Partnership Program.

This first slide shows the Technical Development Team that we have working on this part of the project. Smita Gupta is the Technical Lead of the project. She is a fairly recent graduate Master Degree Program in Solar Architecture at Arizona State University and is a Ph.D. candidate at Carnegie Mellon University, so we really benefit from her technical skills.

We also benefit from the two consultants here that are on the team that have long experience working on the

building standards and are nationally recognized in building energy efficiency and solar, both Bruce Wilcox who is next to Smita and Charles Eley.

We have been developing a software tool that would be used for doing calculations for this program. We chose public domain algorithms that were available for determining solar performance and wanted to get those into a software form so that it could be easily used, so we have hired Dr. William Beckman from the University of Wisconsin Solar Energy Lab to develop a piece of software based on the algorithms that he developed. You may very well know of Dr. Beckman. He originally developed the F-Chart Program and has a long history in Solar Science.

We also have several of the best known people in the industry that are technical advisors to the work, Bill Brooks, Chuck Whitaker, Tom Hoff, and Jeff Newmiller.

This next slide repeats the policy principles that Tim had shown before. These are the things that are really driving this technical work. In particular, the last bullet here, we were charged by the IEPR to develop for the 2008 Building Energy Efficiency Standards a mechanism to address photovoltaic and high energy efficiency in the standards.

We had started work on that when along comes the CSI, the New Solar Home Partnership effort here at the Commission. So, we are planning to adopt those standards

sometime in 2007, but the technical work to prepare for that has been accelerated so that it would be available for the New Solar Homes Partnership and so that the standards would be quite consistent with what is developed for the Partnership Program.

Our intention is in addition to meeting the IEPR policy principles is to extend building standards methods. Building standards are fundamentally performance standards. We develop compliance software for the use of builders and energy consultants to evaluate their programs and optimize performance. We would expect to extend that compliance software to have PV production calculations within that software so it would be packaged in one product that would be available to builders and would be usable by the solar industry and by the energy consultants that advised the builders.

Since 1998, a very strong component of our Building Standards Program has been a third-party inspection process for energy efficiency measures, particularly measures that are somewhat prone to construction issues. So, our intention here is to extend that infrastructure and processes to address proper installation of PV systems.

We also have a history of relying on certification programs for components that go into buildings. We have programs for appliances, for our appliance standards. We

have programs that rely on the National Fenestration Rating Council for Windows. We have the Cool Roof Rating Council certifies cool roof products. We are quite used to that kind of approach for certification and it has high value. We see extending that into PVs, along the lines of what the Commission has done in the ERP Program in the past, but a little more strongly perhaps.

Since the 2005 standards, the Commission has been using time-dependent valuation as a way to attribute value to energy by time-of-use and recognize that in calculations. We would expect to roll that into our calculation approach.

We are working on a calculation methodology here that illustrated by this chart. On the left side, we would be using official weather files from the building standards that have solar radiation and ambient temperature and wind characteristics.

We would be assessing the information about module performance characteristics in the model. We would be addressing design and installation factors, such as the mounting method, wiring configuration, the orientation and the tilt of the array, and any shading obstructions that exist.

The inverted performance characteristics would be accounted for, and we would look to the invertor read out as one mechanism in our fuel verification that I will talk

about a little bit later.

Basically, this in a nut shell is the calculation. We are working on a interface for this piece of software that is very user friendly easy to use. There are a few inputs here. The first, the PV module would be a drop-down menu that would be a look up of the certified PV modules and would have their tested parameters in a look up menu. The mounting would also be in a drop-down menu. You would enter number of modules, number of parallel strings, the slope, the azimuth.

The invertor would be, again, a drop-down menu look up that would have the currently certified data related to invertor performance that exists now with the ERP Program. You would be looking up a city from the standards list of cities, so there would be drop-down file for that. That city would pull the weather file, would pull the latitude, the wind, and all of those characteristics would be automatically pulled when you chose a city.

You would indicate whether there would be no shading on the array and the program would be trying to encourage that, or whether there is some known shading that needs to be addressed. If there is shading, there would be kind of a second level of input that is shown here whereby between cardinal orientations, you would indicate the distance to the obstruction and the height of the

obstruction above the PV modules, and then the calculation would proceed.

The results would be shown both monthly and an annual total in terms of KWh production and also time dependent valued weighted production.

The next slide relates to this no shading criterion. We have been looking at a simple criterion that looks at the avoidance of shading in simple terms and see this criteria of having the distance from the array of the obstruction being at least twice the height distance as a good kind of rule of thumb that would rule out no shading. That would be a simple way to check. So, if installations avoided that, they could be modeled with no shading as the assumption.

Virtually all possible obstructions would be considered in this approach. You can see the various obstructions that are on the roof here in this diagram. Those kinds of things would be looked at. Also, we would be expecting that the shading from trees that are planted and the shading criteria would be considering the expected mature height of the trees.

We've been doing some validation of the production model relative to data that the Sacramento Municipal Utility District has allowed us to use related to Premier Gardens Subdivision. This is just a comparison of the prediction

for west, south, and east orientations of arrays compared to the actual metered data that SMUD has metered there. We believe this is a pretty good match.

In terms of certification, we are expecting that there would be a third party certification process for PV modules that would certify the inputs that the 5 parameter model would use for doing the calculations for the modules. Those parameters are listed here. Those values are normally measured by manufacturers, so the thing that is new here is the certification of those values to the Commission, all of those values and the potential to have an administrative mechanism similar to the NFRC or the Cool Roof Rating Council that is a third party that would do verification of that certification.

Maybe the Power Mart Program or some program like that using the tests that are specified in ASTM E 1036 and based on laboratory verification.

In terms of the invertor, this would be the same certification that is currently being done under the ERP Program.

Related to fuel verification, we would expect to extend the fuel verification process that is used for the building standards. That process is widely being used now as a verification for Title 24 compliance, for utility new construction programs, Energy Star, and recently getting

into the federal tax credits. This is a process that the tires have been kicked on, you know, pretty hard over the past several years.

Basically, the notion is that the installer would test and certify the performance of every system, and then there would be a Home Energy Rating System rater that would verify and test a sample of the systems. The HERS rater is basically under contract to the builder to provide this quality control service and under the supervision and oversite of Home Energy Rating System providers.

There is currently three providers that the Energy Commission has approved, CHEERS, CalCERTS, and the California Building Performance Contractor's Association, and currently there are over 1,000 raters that have been trained by these providers and certified and are under the supervision of these providers.

It is the Energy Commission's job to be very clear about what the fuel verification protocols are and to get that information out to all people who need it. We would intend to have it be approved as appendices to the program guidebook and to the standards.

Also the Commission directs the HERS providers to provide training to the HERS raters on the fuel verification protocols so that we know that process is in place. We review curriculum and approve the providers for doing that

function.

In general, we see the fuel verification process being divided into three steps, three categories of checking. A visual inspection, a shading evaluation, and a performance verification.

The visual inspection is all about looking at the characteristics of the system. Did the right module get installed, the right invertor, are they the same as were specified in the calculation, to look at the orientation and the tilt, from observations are these basically the same as was what was in the calculation.

The shading evaluation would be looking first to see if the no shading criterion is met and also to check for any shading obstructions that would be included in the calculations, included looking for trees related to the shading that they could have on the system.

The performance verification would be a process of in the field measuring the solar radiation at the site and the ambient temperature and looking up the expected output for those measured conditions on a table that would be generated by the Energy Commission's PV software, and then to verify the AC output displayed on the invertor relative to that look up table.

The next chart is an example of what this table might look like that would be printed out by the software.

This would be unique to each installation, so unique to the modules, invertors. For each installation, you would get a table that shows solar radiance versus ambient temperature, and so the installer would check both the solar radiance and the ambient temperature and would find the appropriate cell on this table that would be the AC output. They would do that for every system.

The fuel verifier, the HERS rater that is doing field verification, would do the same thing on a sample basis, and they would be looking for this entry and then checking that against what the invertor display shows.

This chart is just conceptual drawing of time dependent valuation. In the past, annual energy use, the horizontal red line there has been sort of the way people have thought about energy use and did not consider the value of the energy varying over time, varying on a daily basis with lows and highs. What time dependent valuation is trying to do is trying to account for those variations.

Time dependent valuation was developed for the 2005 Building Energy Efficiency Standards, was adopted by the Commission in November of 2003 for use in the 2005 Building Energy Efficiency Standards. A very similar process was decided to be used by the PUC for the 2006 to 2008 Energy Efficiency Program planning process.

The places time of use waiting on energy during

peak periods, the fundamental values account for statewide marginal electricity generation and transmission, and regional marginal distribution costs.

The method is really emphasizing values for variation by time of day and by season. It also captures where there are significant differences between regions on marginal systems' costs.

This is an example of what the production would look like using our model comparing three different climates, Climate Zone 1 Aracata, the North Coast, a little sliver. If you look on the map, Climate Zone 1 is right up the Oregon border. Sacramento and Climate Zone 15, the area down at the southern part of the state that has Palm Springs in it.

This information shows both the KWhs that are calculated by the tool and also time dependent valuation weighted energy. So, basically, across climates. What we did here is we used Sacramento as a base reference. Both the KWh and the time dependent valued energy for Sacramento for south is given a weight of "1" and then the other climate zones are compared relative to that, and the other orientations are compared relative to that.

From a climate zone advantage point, you are seeing time dependent valuations, which are the red bars and the blue bars are KWhs. That legend is there. For Arcata,

the production is a little bit more than 80 percent of the Sacramento South production.

For Palm Springs, the production is about 110 percent in terms of TDV energy, the red bar, relative to Sacramento production.

One of the things that is happening here is that the big emphasis on time of day and time dependent valuation heavily affects the comparison between west and east. The west hours are significantly more highly weighted because of the peak energy in the afternoon. We are seeing that the south orientation being the preferred orientation, but the west orientations under TDV are boosted, and the east orientations under TDV are dampened. So, you are seeing a more direct comparison between west and south and a bigger spread from east with this valuation process.

What we are proposing is an expected performance based incentive structure. It would be based on the PV performance calculator, it would use TDV to place priority on particularly the peak production times, and that would emphasize sunnier climates.

There would be higher incentives for more efficient PV systems. PV systems that were installed with a better orientation, better tilt, those would be incented, and there would be a disincentive that varied in the opposite direction.

The process would be to compare the actual installation to a reference system, so there would be a reference system so there would be a reference system and a reference location, and that would be the base line, and then the actual system would be compared to that.

We have been thinking about what should be the characteristics of the reference system, and we have considerable information about the Premier Gardens Development and view that as a reasonable reference case. We think that the Sacramento area is a moderate area, so what we are proposing at this point is a reference based on Sacramento latitude, longitude, weather, and time dependent valuation, a south azimuth, a tilt that would be similar to what a BIPV system would have on a five and twelve pitch, so this might be a little bit lower tilt than what people might think of it, sort of optimal, but this is consistent with the construction practice we view. BIPV mounting, no shading, and we would look at standard losses in that calculation.

In order to implement this process, it is necessary for the Commission to be very clear about what the verification protocols would be that would be used by builders. In the past, builders have used those protocols as part of their specification documents so that installers would know what is expected of them. We would expect that

the same kind of thing would happen here. There would be an expected performance table that would go to the builder. It also would be available to the homeowner.

The Commission would be developing guidelines for proper tree planting and how to anticipate the expected height at maturity of trees. We have been working with the Sacramento Tree Foundation already to get their insight into how could we describe in a simple straightforward mechanism that would basically be grouping types of trees by height and by width of top.

The Commission would be responsible for making sure the training was available on this process. That is kind of a normal thing that we have to do here relative to accomplish this relative to building standards. We would expect to make this training available to builders, to the solar industry, to building officials, to HERS raters, all the people that need to be trained.

We have been, over the past several years, producing videos that would clearly show how you go through these processes in a medium that can be looked at remotely at the convenience of the people that need to get the training. So, we would expect to do that also.

CHAIRPERSON PFANNENSTIEL: Thank you, Bill. That is a lot to digest, and I for one am interested to hear what the other parties to this partnership believe work and

wouldn't work and might be difficult to do in this. It is clearly well thought out and it clearly integrates what we are planning to do with PV into where we have been with Title 24.

I think we should probably go on to the discussion of the incentive level analysis, get sort of all of this on the table and then we can entertain comments and questions. Sandy.

MR. MILLER: Thank you. I am Sandy Miller, and I work with Jeff in the Renewables Program. What Tim mentioned early in his analysis, and is a critical part of this whole analysis, is looking at the incentive levels and what we could potential do, what we might expect based upon various incentive levels and structures.

We want to get an idea of the outcomes based upon the various assumptions and gain insight into what we could expect. We have a technical support contractor KEMA. Dr. Tom Hoff is a sub-contractor under KEMA, and Tom will be presenting his latest work in progress on this issue.

The Commission doesn't necessarily endorse his results, but is interested in public input on his results that he has presented. With that, we will have Tom come up and give his presentation.

DR. HOFF: Thank you, Sandy. Chairperson Pfannenstiel, Commissioner Geesman, and all of the other

parties who are here thank you for the opportunity to present to you today.

I wanted to just take a minute and give you two compliments as Staff CEC. We do a lot of work throughout the United States and working with people who actually sell PV systems providing software, we do different consultant things.

One of the things that I've seen very very effective is to combine PV with efficiency, and I am thrilled to see what you are doing here because it makes sense, not only from a technical standpoint, but from a marketing standpoint as well.

You take a technology that is sexy like PV, but has more of a cost push. You take efficiency, which is not quite as sexy, and you put the two together, and you've got just a dynamic combination. You guys are such trendsetters here in California, that people follow stuff. So A+ on that one.

The second thing is I wanted to compliment you on your staff. As we go through this presentation today, this is a work in progress. This is not one of these consultant projects you pop in the numbers and out comes the results, there is thinking that goes along on this.

There is analysis that goes along on this, and I have been thrilled to be able to work with CEC staff.

You've got good people, smart people, and it is very very helpful.

With that, let me continue. What I would like to do this morning is to suggest an incentive level analysis. What I am going to present this morning -- actually one more step back. Let me acknowledge Ryan Wiser and Mark Bollinger, who were very much a part of this analysis as well. They have been very important in terms of developing this. So, they are other members of the team.

What I am going to present this morning, the objective is to present a proposed incentive level, incentive decline, trigger mechanism, and what does that look like from the market's perspective looking at the reasonableness of this from the perspective of the market.

In particular, what I am going to be integrating in this presentation is not just results, but methodology by which you get to those results. For example, there is a lot of talk about cost effectiveness, best cost effectiveness tests and how those apply in the market.

One of the challenges of this project has been how do you take standard cost effectiveness tests and pull it together to tell you what's going to happen in the market. We have really spent a lot of time trying to think through how do we do that.

Let me lay out a couple of program goals and key

assumptions that are involved in the analysis. We have assumed that there is going to be 400 MWs of PV installations. It is going to start as an incentive decline of $2.25 per Watt. The incentives are going to decline 22 1/2 cents per year until they get to zero.

From a market standpoint, we are assuming that the market is going to grow at 35 percent per year, which means every year it is going to get 35 percent bigger, and when you put those assumptions together, that results in a $300 million budget.

One more set of assumptions that we have done to perform this analysis is that as Bill has talked about, you are moving your incentive structure from a capacity-based incentive structure to an expected performance-based incentive structure. With that move, there is likely to be some adjustments that you are going to need to make in terms of the incentive levels and how those change over time.

We've talked a lot about how to present this, and we decided the best way so you can think about the incentive levels in terms of the current market is to present the incentives as calculated under your current ERP Program.

Once you set those levels, there is really a second step that needs to happen. How do you translate those levels to your new expected performance-based incentive. So, I am not doing that translation.

We are assuming an $8.50 per Watt PV system price. This is based on an analysis over the last three years of the ERP Program data. Two KW PV systems that produce 3050 KWhs per year. This is equivalent to about a 17.5 percent capacity factor, which is, again, validated through your RER reports in the past.

The electricity price is a highly sensitive one. As you know, we have rate structures that are very highly tiered that go from anywhere from 12 cents per KWh to 35 cents per KWh. That assumption is driven by how big of a PV system do you put on and how big is your housing consumption, how many KWhs consume.

What we've assumed for this analysis is 2 KW PV on a house that consumes 8,000 KWhs per year. We assume that the 30 percent federal tax credit capped at $2,000 is available throughout the life of the program, that customers finance the system through part of their home loan, a 6 3/4 percent home loan, 30-year home loan, and as part of that home loan, they are going to get tax deduction benefits at a 28 percent federal 9 percent state income tax bracket.

One other assumption we have on here is we are assuming a housing market of 120,000 houses growing at a rate of 5 percent per year.

Let me go through three steps of the presentation. One is I'm going to talk about the methodology. The second

is, I am going to show tabular results of the methodology, and finally I am going to show graphical results.

First of all, how does the method work. There are three steps to go through. First of all, you design the incentive structure in order to satisfy your program goals. The second step is you calculate the cost effectiveness. The third step is you determine the implied market demand.

Let me make a comment about this implied market demand here. Essentially, this is going to go through the analysis and says based on your goals and the cost effectiveness, this is what you need to believe is going to happen in the market as a result of your goals. That is essentially one of the key outputs of this method.

If you will notice across the top, you will see we have these three steps highlighted in green and in gray gray to tell you where we are because we are going to jump back and forth a little bit through this.

First of all the incentive structure needs to be consistent with program goals. As I said, we are going to calculate it using the current ERP incentive calculation methodology.

One of the items that is up for discussion, certainly within the CSI Program, a lot of comments are coming in this, as well as your program, do you use a volume based trigger or do you use a calendar base trigger.

Based on the analysis that we've done from an analytical standpoint, you can design the program either calendar based or volume based and land at the same result if you assume exponential market growth.

This is one of these real nice mathematical niceties that just happen to work out this way. If you look at, for example, filing that have been made by a number of solar parties to the CSI Program, and you plot the incentive decline versus the growth, it is linear to the exponential growth, which means if you have a market that is growing exponentially, you can design your program with a calendar trigger or a volume trigger. That is from an analytical perspective.

There are certainly different impacts whether you use a volume trigger or calendar trigger. You are going to accomplish different goals, but from the analytical perspective, it is a nice assumption that works out for us.

The second step is to calculate the cost effectiveness of the systems. Now this is a hard one because there is a lot of different tests and how do you define cost effectiveness. You've got tests out there that are net present value, internal rate of return, simple payback, simple payback with tax savings, break even, cash flow. There are all kinds of tests, which one do you want to choose.

We chose the net cash flow, essentially the first year net savings, and that is defined to be what are the benefits of the first year minus the costs in the first year. The thinking went along like this. You have a very nicely defined market of new homes. One of the things new homeowners are going to care about is how much did my mortgage go up and how much did my utility savings go down, and that seemed to be a logical test in comparing what was the increase minus the decrease, and the difference between the two is your first year net savings.

The costs include the loan payment for the PV system and also a projected invertor replacement cost. This is on the order of a couple of cents per KWh. We have included that in the test even though it does not occur in the first year.

The benefits are the first year utility savings in terms of cents per KWh, that is that 18 cents per KWh and the loan interest tax savings. This is the savings that the consumer is going to get by having a higher loan payment, they get more interest right off of their loan, so those are the four components.

There are a few things we don't have included. We did not include other maintenance costs. They are minor, should be minor because we have the invertor covered. We assume that the increased property value is incorporated and

reflected in the utility bill savings, and we have not calculated environmental and other benefits that consumers may include in the test.

One other comment that this first year test does not do, since this is a first year snapshot, it does not look at what is going to happen with electricity rates over the long term, so you can have a person buy at a slightly negative first year net savings knowing that my rates are going to go up and my savings are going to go up over time.

The third step is then to determine the implied market demand. We do this by estimating the total market potential and dividing the new solar homes partnership sales by total homes to get the percentage of penetration.

Now let's go through and actually show the numerical results in a tabulative format. This is the incentive structure that comes out of our assumptions of 400 MWs per year, $2.25 a Watt declining, one-tenth of that amount every year. The incentive starts at $2.25. In order to satisfy your growth, your 35 percent growth projection, you need to start at 7 MWs, go to 10 the next year, 13 and so forth until in the final year, your incentive is 23 cents per Watt, and your volume is 109 MWs.

The second step is to calculate the cost effectiveness on a year by year basis. The way we do that is we take the incentive for that particular year combined

with our projected cost and other costs for that particular year to calculate the net savings. As you can see, the first year net savings is 2 cents per KWh for a customer who invests in 2007. That means their loan payment is going to be perhaps 28 cents, an invertor cost of 2 cents, which puts us at 30 cents in costs, and 28 cents in benefits. So, there is a difference for that first year.

That is not over the lifetime that their rate is going to go up, their savings is going to go up, but that is the very first year test.

Next we calculate the market sales by taking the volume, which is 7 MWs, dividing by a 2 KW PV system, which gives us 3,500 systems per year in 2007, divide it by our 120,000 new homes, and that results in market sales of 3.1 percent. When you go down to the 2016, you take the 109 MWs divided by 2 and divided by the projected number of new homes to get your market sales of 29.3 percent.

Finally, when you combine the two together, the net savings and the market sales is essentially your implied market demand. So, to read this chart, it says in the first year 2007, new home buyers are going to have a net savings of -2 cents and 3.1 percent of the market is going to buy that. Again, that number can be negative because that does not include estimates of what is going to happen with inflation with electricity rates. There is no hedging

involved in there at all.

Let's go through the same results graphically to show you what these look like on a graphical basis. This is the incentive structure if you choose to use a calendar trigger, and you can see starting in January 1, 2007 the incentive is $2.25 a Watt. January 1, 2008 it bumps down to $2.00 a Watt and so forth all the way until December 31, 2016.

If you take this same data and plot it on a volume basis, you can see that you install a smaller amount, our 7 MWs in the first year of the program when the year correlate. The first year of the program, when the volume grows, when the volume triggers hit, you have larger and larger incentive buckets by with which you are covering, which you paying your incentive.

For reference purposes, I put the dash line of where the current ERP $2.80 Watt incentive is, so you can see how that relates to the $2.25 a Watt goal.

The second step is to take the cost effectiveness numbers and we have plotted those starting in 2007 all the way through 2016. You can see that they get increasingly better over time so that the systems are more cost effective from the perspective of those first time buyers.

The last step of the analysis is to combine the net cost, that net savings, with your market sales, and to

put them together graphically. On the Y access, you have the number of percent of new homes with 2 KW PV systems. On the X access is the net savings in dollars per KWh, and each point in the year in the analysis is shown, 2007, we had a net cost essentially of 2 cents with an implied number of homes of 3 percent.

When we hit 2009, we have a zero net savings, and 5 percent of homes are putting in the system all the way on out to 2016.

This chart is intended to say -- there is lots of data in this thing. There are lots of assumptions, there are lots of cost projections, cost effectiveness analysis. This is really designed to say do you believe this is what is going to happen in the market over time. So, it really is an implied market demand of in order for us to get to the goals, this is what needs to happen.

You could read the chart in a variety of ways. One way may be to say, let's look at the point when there is neither net savings or net costs. We will take the zero point and said how many new homes need to install when it is neither positive nor negative, and that number turns out to be five percent of new homes need to put PV in at that point.

If five percent of the new homes will install PV systems at the evaluation point, your 400 MW goal is

reasonable, your $300 million budget is realistic, and the incentives should start at $2.25 a Watt and decline 25 cents per year.

If it is not reasonable, you should say, well, which of these goals do we want to change, do we change the budget, do we change the MW goal, do we change the incentive rate, what needs to change. Those are really your three options to change to affect that market demand. The incentive rate starting, the MW goal, and the budget.

As we look forward in terms of progressed tracking and corrective action, that demand curve may need additional marketing efforts to achieve greater market demand, or if you track that and it doesn't meet your goals, you may need to adjust your budget or MW goals in response to actual market demand over time.

CHAIRPERSON PFANNENSTIEL: Tom, I think before we open this to general discussion, which is really the next step, I just want to make sure I understand your 35 percent market growth assumption. I think all of this sort of hinges on that. We talk a little bit about where that came from and what happens if that is off.

DR. HOFF: What we did, again, this is a good question. One of the real tough parts of this is there is methodology and numbers of where do you get these from. What we did was we looked at the world market growth in a PV

world market growth. You have some places like Germany that are growing at 50 percent per year. You have some places that are growing at less. We took the average number as reported by Solar Buzz for the world market growth of PV in 2005. It was 34 percent, we rounded it up to 35 percent.

CHAIRPERSON PFANNENSTIEL: Thanks.

PRESIDING MEMBER GEESMAN: Tom, where did you get your tax bracket assumptions?

DR. HOFF: These are marginal tax brackets, and so we assumed that the homeowners putting in the systems will be making less than $180,000 a year on an adjusted gross basis and greater than I think 60. So, it is a pretty big band for the 28 percent. It is really based on what is the homeowners income level.

PRESIDING MEMBER GEESMAN: Did you corroborate that with any data about who buys new homes or who among new homebuyers is a likely solar purchaser?

DR. HOFF: We have not done that piece, no.

PRESIDING MEMBER GEESMAN: In the 28 and 9, that is before the taxpayer takes any deductions or his conventional home mortgage and associated property and income taxes?

DR. HOFF: It is based on the adjusted gross income. You take off, you take your income, you subtract your IRA deductions and those things, and you get to the

point right before you start doing your standard deductions, so it is based on the adjusted gross income number.

PRESIDING MEMBER GEESMAN: Thank you.

MR. TUTT: Tom, you had a slide which showed the current ERP incentive compared to the $2.25 a Watt start of this new program, and I just wanted to make sure that everyone understood that the ERP incentive is expected to take a slight jump down to $2.60 in July of this year. So, there will be an intermediate level phasing in between the current level and the start of this new program.

DR. HOFF: I am sorry I didn't point that out. Thanks, Tim.

PRESIDING MEMBER GEESMAN: Let's go to blue cards. Anyone that cares to address us, if you would fill out a blue card, it would be helpful.

Rob Hammon from ConSol.

MR. HAMMON: Thank you. Good morning, to the Commissioners, Staff, and public, and Chairperson Pfannenstiel, congratulations on your new appointment.

I am Rob Hammon from ConSol. I would like to just start by saying I support the staff draft. I think it is a lot of hard work that has gone into it. There is a growing need for new housing in California, and there is the opportunity with this program to make it more efficient and incorporate renewable energy. I think that is a strong and

worthwhile goal.

This program provides an opportunity to provide sustainable voluntary program that would encourage the construction of highly efficient homes with solar. It is to that end that we want to make sure the program is designed to work that way.

There is demonstrated consumer interest in photovoltaic, and that interest has provided an opportunity in the market to encourage higher levels of efficiency when coupled with the solar as Tom mentioned. That is a demonstrated effect to my way of thinking.

I support the concept of a two-tiered approach with a minimum being at about 15 percent over Title 24 plus a higher tier that would be targeted at perhaps as high a 50 percent bill reduction based upon things that we have done within the Building America Program.

I recommend that there be additional benefits at the second tier that would encourage builders to go there, and I look forward to working with staff and this Commission to help design that.

I am concerned about coupling the program to EnergyStar. There seems to be a coupling of 15 percent over code in the EnergyStar Program. I think you should go with a percentage over Title 24 and not coupled to EnergyStar. There are some things within that program that are starting

this year that may be detrimental. There are some things in the out years that could threaten the program.

I recommend a delay in the coupling of the program to advanced metering. I don't think the utilities are quite ready to do that in 2007. So, that could be done in the out years.

I am concerned a little bit about the starting incentive levels, they seem a little bit low, but that is something that hopefully we can work on over time. I am concerned also about the complexity of the third-party field inspections. We need to make sure that we couple 100 percent inspections by the installer with third-party inspections by raters and make sure we balance the technical strengths of the two so that it is a workable system, workable in the field.

I think we need to work together to make a simple viable program that can encourage energy efficiency and renewables in new homes, and I look forward to working with you toward that end. Thank you very much.

CHAIRPERSON PFANNENSTIEL: Rob, as you know, I've been concerned about having a program that is overly complex, at least at the beginning. While I think what we have heard today is a lot of really excellent analysis and a good way of beginning, I'd like your thoughts on whether it appears to be going in a way that is too complex in terms of

the incentive levels, expected performance based incentive levels.

You commented that you thought the third-party inspections might be too complex. Overall, what do you think the trade off is there?

MR. HAMMON: I think we are headed in the right direction. Bill and his staff and I have had some discussion about how to do this, and I think we are headed in the right direction of making the program simple to operate. I think having two tiers rather than a sliding performance is a simplification that is worth while. Having the incentive be up front and calculated on the performance estimated by a model that Bruce has been working on, makes sense.

I think they have done a lot of things to simplify the way that it can work. When we first started talking about the third-party inspections, they were going to go up on the roofs and do measurements, and I think we just need to -- that is gone, thank you very much, Bill. I still see measurements being made on the solar contribution that may be problematic in the field.

We just need to work through those things and make sure that it is something where the instrumentation is simple and affordable for a rater but also there is little margin for error in something that may not need to be

terribly precise in terms of a third-party verification.

I think what you want to do is rely on the 100 percent inspections by the installer where they are doing a lot to verify that you are going to get the expected performance and that you keep the third-party rater part fairly simple, enough to insure that installer did what they were supposed to do.

PRESIDING MEMBER GEESMAN: Thanks, Rob.

MR. HAMMON: You're welcome.

PRESIDING MEMBER GEESMAN: Juliette Anthony, Californians for Renewable Energy.

MS. ANTHONY: Good morning. I am Juliette Anthony, and I have to clarify that I am no longer with SPG Solar. I resigned in May intending to retire, and I am a non-profit junky, and I got offered this position with Californians for Renewable Energy, so I am back working part time.

I wanted to say one thing that if you are talking about simplification, I have to say that incentives based on performance is the simplest way. You don't have to have third-party inspections, you don't have to have all of this, and it is the most accurate and the most simple way to go.

Building on that, I have a chart here, which I did give to Martha Krebbs several months ago, from the International Energy Agency, and it talks about highly

integrated systems on slope roof, and it talks about the raise in temperature because of lack of air circulation. I am quoting here, "This results in a loss of 10.3 percent."

I noticed in your proposal that you were hoping to put the most emphasis on the hot areas. At peak times, that may not produce the energy that you are looking for. If it is a performance based incentive, it doesn't matter because you will get the performance.

If you are planning to give those people higher incentives, I would definitely not think for the rate payers point of view, they would get the best bang for the buck. The second thing I would like to say is that you are planning to put small systems, 2 KW that produce 3,050 KWs a year when the homeowner is using 8,000. So, what you would be doing is not what the ERP Program has been doing up to now, which is to zero out at some point the energy usage in the home, you are just shaving a small amount off.

Now every house that you go to it costs to go up and down and up and down, and I am wondering if putting tiny systems -- many of these new homes are mansions, frankly, I am wondering if that is the best use of the panels, when we are short paneled, and you are not getting the production that is going to allow the homeowner to really avoid raising electricity prices.

I am now working for the ratepayers. Thank you.

PRESIDING MEMBER GEESMAN: Thank you. Bill Kelly, Powerlight Corporation.

MR. KELLY: Bill Kelly. Thank you for hosting this event. We were excited to see the program getting underway in plenty of time for the industry to plan for its implementation next year.

A couple of things I want to mention. I am extremely concerned about the complexity that is being introduced in the incentive program, where I think all of the ideas that make sure the systems are installed properly are important. I think that right now from my perspective in working with quite a few builders in the industry, we are reeling from getting rebates in place, applied for, and secured for projects, and what I am hearing is actually quite a bit more criterion being added to the application process.

One simple thing towards this performance based criterion, many of the builders will be planning solar on communities that they don't know the actual homes that will be installed on each lot. So, it will make it virtually impossible for them to predict the incentive for that lot when they reserve that incentive as a result.

The other thing that one of the assumptions in the incentive structure is that in '07, that there would be 3,500 homes, I believe, was the number assumed at year one,

and then building at 35 percent a year from there. I don't think that is a likely quantity to start with. If we start with a far lower quantity, the impact is severe on the penetration of solar in the new homes market. I think that really should be considered particularly when the recommendation has dropped the incentive about 25 percent from what it is today in the beginning of '07. I think that might be difficult to achieve the early goals of 3,500 homes next year, both dropping the incentives and make the incentives more complicated for builders to apply for and secure.

Overall, I would like to say that the fact that the Commission can provide support to builders and guidelines and inspections to make sure systems are installed properly, I think that would be very helpful, and I actually welcome the builder community that they would have, for example, some certification process to get assurances that they are getting systems installed properly.

Ultimately, I think that the builders that are doing this are doing it for customer satisfaction, and there is real incentive on their part that they get systems that are performing or if they are relying on that for customer satisfaction.

Thank you.

PRESIDING MEMBER GEESMAN: Thanks very much. Mike

Keesee, SMUD.

MR. KEESEE: Good morning, thanks for the opportunity to speak today. I have some prepared comments that we've dropped off. I will try to keep my comments brief, but there is a lot of stuff here that we have. So, I am going to try to go through these in bullet fashion, and then try and address some of the issues that I saw come up that I just saw this morning real quickly.

The first thing that I think we would like to say is that SMUD supports the idea of going to the highest level of efficiency from the get go. There are several reasons for this.

One is based on our program experience and as background, just so those that don't know, SMUD has been working with builders on solar since the year 2000 where we first required builders go into our efficiency program at that point, and they went in at a highest level for those builders that participated in that particular program.

Since 2003, we have been participating with the Department with Energy Building America Program, which we are now going to use as a model for our new construction program starting with the change out in 2008, it is our opinion that we need to make the cost effective and the maximum amount of investment in the energy efficiency measures in the home first before we put on any kind of

renewable energy or energy source at all on the home.

Finally on that regard, we are under contract with the National Renewable Energy Lab NREL, who is the Building America Program Administrator for DOE, and we were asking them to look at what we should be looking for in the near future on energy efficiency measures that reports in draft stage now. When it is final, we will be happy to make a copy available to the Energy Commission.

It is very interesting, but one of the conclusions which is in our written comments, states that it is much more cost effective to put a 2 KW system on a very highly efficient home, meaning a home that meets the Building America standards and do so particularly on peak resource needs, meaning our peak demand needs, than to put a 4 KW system on a Title 24 compliant home. That in itself I think is a very powerful argument to set the incentive levels as high as possible.

Another reason is that you have a very limited amount of resources to take on a very big job, and we at SMUD have taken the approach of doing these high efficient homes with PV in sort of demonstration way, and we think that is the best way to sort of demonstrate to the builders what is actually achievable. It also provides the biggest marketing push or draw or whatever you want to call on to it. In a sense, it will lead to what we think is market

transformation because that is really what I think you want to look for in this program, as well as putting glass on roofs, as we say.

There is the opportunity here to really transform the new residential market to something provides a product that is the most energy efficient and energy producer as well. It is an opportunity that shouldn't be missed. We have during the program experience of SMUD's solar programs, lots of experience certifying and warranting of system components.

We have installed a number of systems in SMUD under SMUD's banner if you will. We were the installing contractor and the like, and we can share with staff or otherwise, some of the issues that we've come up against. This issue of third-party inspection is a tricky one because it is not an easy thing to go out and certify the performance of a PV system.

For example, one of the things we do when we go to troubleshoot a system is that if you really want to know what is going on and you can't get it right away, you've got to do what is performed an IV Curve Analysis. An IV Curve tracer is a specific piece of technology that you have to purchase, and it is not inexpensive, and you cannot avoid getting on the roofs. You have to take module temperatures, you have to get the right tilt and so on and so forth. It

is not an easy thing, there are some issues there. Again, we would be happy to share with staff and the Commissioners more in-depth about that.

One of the things we do do currently, however, under our retrofit programs and I am going to adopt it here soon in my new home programs, is that we do require the installer to produce a commissioning report which can be used to verify performance issues in the future.

Doing that commissioning report, if it is done by a third party, the issue there is that the third party has to be familiar with electricity and how to get into panels and how to do the measurement using volt meters and amp meters correctly.

I will just say to my friends in the home energy rating business right now, I don't think the expertise exits out there yet. I think that is a good point to get to, but it doesn't exist out there.

The last thing I will say about certification on components and third-party verification is that we support it, we think it is long overdue, we are members of Power Mark or we going to join the Power Mark Board of Directors, and one of the things we need to move towards is the certification of PV systems in general. That is, the whole system, not just individual components.

Along those lines, we would also urge you to take

a look at rating systems by their true AC rating. When we have done that at SMUD, we have insisted with the manufacturers we worked with on the projects we worked on, we put that under our own performance index, which is a monitoring system we put together with Sandia Labs, and it becomes a very easy way for us to tell what is going on out there. If it isn't doing what we think it is, which is typically over 90 percent of expected production, we know there is a problem. It is somewhat Juliette mentioned about KWh production, and that is really the easiest way to verify the systems are doing what they are supposed to.

Quickly on target markets, we would, again, allude to our program experience and suggest to the Commission that particularly where you want to target the New Home Solar Partnership, is to work with the BIA and their local chapters to put together demonstration programs or projects with the local builders.

Again, we would urge you to look at the DOE model and work very actively or in partnership with the Building America Program. They've got the resources in place and the experience including the consultants and the contacts with the building industry itself. There isn't a magazine, a builder magazine, which is their National Oregon, come out without some mention of green building in the program itself.

They have done a good job of really working with the builder community in that regard. I would suggest that would be an excellent way to demonstrate to the builders what it is that they actually have to do and use that as the training opportunities. It also, for those builders who decide to get involved, they are going to reap all the benefits of it and create some real market demand and pull we think.

You asked about encouraging the publicly-owned utilities to participate. I think the POU's I guess we are now called, I always used to say MUNI's, but POU sounds all right too, is that several of us are getting involved in this. We have a regular meeting that some of the staff are aware of. We would encourage the staff and the Commissioners to get involved with what we call our Muni PV Manager's Working Group that we meet on a quarterly basis. Get involved with us there because that is sort of where the real day to day work happens.

Of course, the existing publicly-owned utility organizations like CMUA and critically NCPA and SCAPPA, the two power marketing groups that work with the California municipals, you asked about incentives for PV as standard versus option, we say it's got to be standard. It is just that simple.

We support what you are doing with the affordable

housing. The one thing, we have adopted your 25 percent adder for the incentive. The one we would suggest would be to look at figuring out a way of how you can run the solar system through the common area meter. SMUD is unique in that we allow that in our service territory, in addition, we allow for excess production to occur, but in talking, in fact, I have a meeting with a department person today, when you start talking tax credits to them, their eyes get very big because they can pass that along to their investors who can really do that.

You've got to get it as a commercial system. The way to do that is to run it through the common area meters. We support the idea of doing the builder marketing support activities, in particular, whatever you can do to bring the builders and their subs up to speed on installation on this. I would suggest that if you do any market research activities, and, again, we are interested in working with you on that, is that you use a consultant that has worked with builders. That is very critical.

We think that the term should be extended to 36 months. Every builder we have ever talked to says give me three years on a project, 24 months is not enough, 36 is a minimum.

A couple of other things here that I would suggest based on what I saw this morning is that the market is a

tricky thing, and I don't have any research. This is sort of my gut feeling with working with builders the last 15 years is that I think the market has sort of a tipping point for the introduction of any new product or technology into that.

To me, it is around the 10 percent mark, particularly if you target leading builders. That is another thing I would suggest you do with this program in doing those demonstrations, is go after the leading builders in that market, whatever that particular sub-market is.

If you get about 10 percent of the market going and it is being done by the heavy weights in that market, people like D.R. Horton, Centex, or Lennar, guess what? Everybody else is going to rush after them because they can't allow someone like that to dominate the market and have something as a hold over it.

That is sort of just a caution in this is that you might get to this 10 percent mark. We might get there relatively quickly. We don't know yet, but if you do then be prepared. That is something that I said to my solar manufacturing friends as well because they need to provide the market.

Anyway, we welcome the opportunity to work with the Commission on this. We are happy to share our resources with you and your staff. We hope we have been -- I know

sometimes I get a little testy because of the time, but we certainly want to cooperate with you as much as we can on this and look forward to working with you in the future.

PRESIDING COMMISSIONER GEESMAN: Mike, let me ask you on the efficiency side, would you tie the solar program to EnergyStar or Building America, or would you take the approach I believe Rob Hammon suggested it of trying to apply a percentage above Title 24?

MR. KEESEE: What we said in our comments is that we would tie it to the Building America standard as a target, meaning that you should get as much as you can. Right now it is around 30 to 40 percent depending on the model depending on the location. That is our feeling. I don't think we would support lower efficiency. In fact, that is what we are working with on our program is a transition in 2008.

PRESIDING MEMBER GEESMAN: Thanks very much.

MR. KEESEE: Okay, thank you.

MR. PENNINGTON: Mike, I just wanted to thank you for all the help you've given us related to data and talking to us, and I appreciate that.

MR. KEESEE: Sure, good.

PRESIDING MEMBER GEESMAN: Joseph McCabe, Energy Ideas.

MR. MCCABE: Thank you for the opportunity. I'm

also working for SMUD right now, and following Mike, he did a very eloquent job of talking about what SMUD is interested in. I am there two days a week. jmccabe@SMUD.org on Tuesdays and Wednesdays.

Today I will talk fast, and if you will allow me, put on another hat. I think you guys have done a phenomenal job with all the layers of complexity. It is this huge onion that has all these stakeholders and interests and your staff and Tim has presented it in a very eloquent way, so I congratulate you.

There are some things that I would just like to bring my awareness to, and it comes from experience from PIER and other solar activities. Bill Pennington's presentation was very good. Thank you. There is one thing that is new in this that a lot of models don't have, and it is installed normal operating cell temperatures.

The second person up here mentioned here. You are putting systems in hot, dry climates. One unfortunate aspect of building integration is they get a lot hotter. My one suggestion is to capitalize the installed. This is something that is not manufacturer's data. They have normal operating cell temperature on the modules, but the system itself has a installed normal operating cell temperature, and that gives you the effect of all the heat build up, and that is what will help address the previous person's

comments.

This presentation is very photovoltaic specific coming out of the buildings department. The next step ideally is to integrate that EE into this. The mantra that Mike mentioned just a mention ago, but I would like to repeat if I could. EE and PV helps reduce peak. So, the right kind of EE can put your peak time. It is a wind thing that PV is now getting into time of use. EE and PV helps reduce peak. That is just a beautiful thing that hopefully we can get more of.

Stick on the shading issues. I mean it is something that has not been discussed enough in the industry and I applaud you for doing that.

The other verification, fuel verification. Ideally in the future, will have an ansi standard on commissioning photovoltaic systems and possibly commissioning of efficiency and photovoltaic systems. The value added in all the systems is increasing and every commercial building has a commissioning process.

It goes from the initial thought, design, installation, and certification, and so I would hope that maybe PIER could fund something that is commissioning.

Let me reiterate what I do with SMUD. I am specifically targeting the Solar America Initiative at SMUD. Right now at the National American Home Builders Association

in DC, there is a team meeting on SAI. So, we are kind of looking at two different activities, the California and the New Solar Home Partnership and the SAI.

One other reiteration of what Mike was talking about if Building America Program can be used as a model, we can really get to these goals and objectives for the state. That is my SMUD hat.

If you will allow me to put on my ratepayer of an investor-owned utility in California hat and wear my Energy Ideas hat. There is something I am challenged with, and the solar industry is challenged with its solar hot water.

The initial program is great. It talks about solar hot water twice. One of those is a foot note, it says photovoltaic 80 times. I think it is a psychological barrier, and the good news there is we can get over it, get over the past, and get to the future. Where in my world, there are lots of places in California that integrated collector storage combined possibly with on-demand hot water can really be a good solution.

I want to just mention maybe the new guiding principle at the CEC is the Integrated Energy Policy Report. I see a lot more fluids in this than ever, water, gasoline, and liquified natural gas. It is confusing to me to go to Indonesia, harvest natural gas, put it in a pipe, put it into a boat, ship it over here, bring it off the boat, put

it on a pipe, put it into the residential houses to heat the hot water when we can do it on the roof at a very low cost.

San Diego's reports are showing $2,500 installed costs for collectors. What the industry wants if you ask NREL, Building America solar thermal people, they want $500 to $1,000 extra incentives, so this is something I hope I am not too much of a pebble in your shoe, but this is a time when photovoltaic next to a solar thermal collector on a systems approach can really help the goals of the state.

With that, I really thank you for what you are doing, and let me know if I can be of further help. Thank you.

PRESIDING COMMISSIONER GEESMAN: Thank you, Joe. Kirk Uhler, DRCI Solar Power, Inc.

MR. UHLER: Good morning, Kirk Uhler with DRCI and Solar Power, Inc. With the exception of my friends of Power Light, we are probably one of the only folks in this room actually currently selling and installing to new home builders. DRCI in partnership with (Indiscernible) Solar is currently under contract in a little over 200 homes to be built the remainder of this year and into next year.

Please forgive the relative disjointed nature of some of my comments. We covered a lot of ground today. As somebody that is actually out meeting with home builders right now, I wanted you to have a little bit of feedback

based on this.

First of all, everything Bill Kelly, ditto that. A 24 month reservation, Mike Keesee spoke to that. It is a step in the right direction away from 18 and toward 24, however, what you have to understand is if we are going to attack this at the development stage and start including solar into development projects before they got sold to builders, you need more than 24 months.

The development stage is largely where a lot of your major policy decisions are made. When it comes to what is going to be included in projects in order to mitigate against other issues like air pollution and those kinds of things, so solar requirements in larger developments can be included at the development stage before it gets sold to an individual home builder. We need to have a good understanding as we move forward with this. When you are talking about requirements for orientation, shading, and those kinds of things.

Please understand that an awful lot of local jurisdictions are making planning decisions away from your traditional grid-type streets with due south orientations on either the front or the back of the house. They don't like seeing those kinds of subdivisions any more. They want to see meandering streets.

When you get outside of the Sacramento area, and I

know Sacramento has its own tree ordinance, when you get outside of the Sacramento area and up into a lot of the foothill communities, you have oak tree preservation ordinances that require builders to keep trees in place and incorporate those into their developments. When it comes to shading related issues, they are simply unavoidable based on the mapping process. Please have a process that makes allowance for those.

We need to create a process that allows for the "upsale". One of the marketing tools that we are using in talking with homebuilders is discussing with them putting systems, minimum size systems on all homes or a certain percentage of homes and then creating the upsale opportunity on solar just like they do with carpet and counter tops. Create that incentive for the builder in the sales process to participate in selling a larger sized system by creating that upsale opportunity.

So, a rebate program that allows for that upsale opportunity and gets the builder engaged in that, would go along way towards putting larger systems on more homes.

Please pay attention to creating focus in the market poll area. Every builder we meet with asks the question do you have the market data that shows that people want this, is this simply one more thing that we are going to have to shove down their throats versus do people really

want this. Certainly respecting the fact that your program, the CPUC's programs, and how you spend money respectively are larger different. If we can take some of those Flex Your Power dollars that we see on all those ads, and redirect some of those to generate your power dollars or something along those lines, creating the market poll is integral to getting the builders to feel like this is something they want to incorporate.

Mr. Hoff's assumption of the price per Watt installed, a lot of the numbers that we saw were based off an assumption of $8.50 a Watt installed. Please understand that building integrated photovoltaic is more expensive than what you have historically experienced with retrofit solar.

Retrofit solar, which I believe most of these numbers would be based off, Tom, unless I am missing something because you are looking at the historical data used the traditional glass panels, and retrofit installers have a lesser insurance requirement than those of us that work on new home roofs.

The insurance requirement for those of us that get on new homes in six to eight times what it costs for retrofit installers. So, please understand that there are other market forces that are going to affect that $8.50 a Watt price. I don't know about Bill, but we are a ways from being there yet.

A comment was made earlier about tiny systems on mansions. Please, any step toward incorporating solar onto any house is a step in the right direction. We are currently on the roof in a 84-unit subdivision in Redding that range in size from 1,600 square feet to 2,700 square feet. They are all going with 2 KWs. The 1,600 square foot model, we had a real tough time finding proper roof space that was going to allow us to actually get 2 KWs on those roofs. We are not dealing with tiny systems on mansions when it comes to these production home builders.

I will just finish by saying please when dealing with the new home builders, understand that making it simple is so much better. We go out and we try to sell this to them by allaying their fears, by separating them from the worry of all the requirements, and we try to take a lot of those responsibilities on ourselves. The way we try to explain it to them is, look, yes, after the first -- with the first couple, we will work through this together, but pretty soon, we are going to show you how working with us is like worthing age fat contractor. We will show you how we get included into your critical path, when you call us versus how we integrate when you are referring your electrician.

We are designing that system to make it easy and allay their fears so I think making it easy and creating a

market poll are the two biggest ingredients in making this successful for new home builders. Thank you.

PRESIDING MEMBER GEESMAN: Thank you very much, Kirk. Noah Horowitz, NRDC.

MR. HOROWITZ: Good morning, Commissioners and staff. I am Noah Horowitz with NRDC. I am an energy efficiency nerd, not a solar expert, so with that temper my comments, but in general, we are very encouraged by the wholistic approach that has been used in considering where to go here, and it is very encouraging that we are linking energy efficiency and renewables rather than fighting against each other, give me the money for renewables, we don't do efficiency and hear everything is aligning up nicely.

One thing in the analysis, we have seen everything based on a 2 KW system, and maybe there is more data available, but I want to make sure is that the right place we should be placing all of our eggs. Go into this what was very appealing to me is let's put a lot more energy efficiency and because that is lower first cost and more cost effective, and as such, you can reduce the size and hopefully the cost of the system. I haven't seen a comparison of how all of that plays out and why we landed at 2 KW.

Next I want to comment, I saw a lot of different

places that were going to require certification of individual systems or components or maybe the whole system, and in general, that is a trend we support. One word of caution, though, is creating these systems takes a lot of time. I still have scars from helping found the Cool Roof Rating Council, that took several years just for what's reflectivity of roofing material.

So, let's make sure if we do have those certification systems, we look at the time when we need them and get going on those.

In terms of the performance verification, is the system performing as promised, are we getting our money's worth for the rebates. A lot of thought has gone into it, and I think we need to continue to work with the different stakeholders. So, what is it that we need to verify the performance of who is going to do that performance and what percent of the homes will have that performance testing done. We have gone over this, and at times contentious, but it is an important dialogue to have.

Next I wanted to comment -- stole my thunder, and I was glad to see it, hot water heating, roof tops, solar, hot water heating, wasn't part at all of today's presentation. That has much faster pay backs and is more cost effective than roof top PV, yet we didn't hear about it, and it is struggling in the market. Is there a way to

integrate the whole thinking here, in particular, when one is trying to sell this to a consumer, what is that piece missing. So, if there is a way to integrate it and further help the branding, that would be great.

In terms of branding, there are energy efficiency programs now, there are various zen homes programs, how does this fit into all of this, so what is the home that meets the more energy efficiency threshold, also has roof top PV, may also have the roof top hot water heating system. What is that called. We've got four letters EE PV, PV is the head of the CPUC, and I don't think we want to call them PV homes, but it is probably something between that and EnergyStar that would make a lot of sense.

Those are my comments, and, again, I am very encouraged by where we are going.

PRESIDING MEMBER GEESMAN: Thank you, Noah. Dick Lowry, Sharp Solar.

MR. LOWRY: Hello, I'm Dick Lowry from Sharp Solar. I just have a few brief comments. We at Sharp are very excited about this program. We think it is very well thought out and very well designed. I'd like to highlight a few things that could potentially be bumps in the road. We would of course like to see a smooth ride.

We strongly support the use of expected performance base payments and up front payments. We think

that long term drawn out payments will create a liability for home builders they will be unwilling to take on.

In terms of energy efficiency, we very much support the intent of linking energy efficiency with solar. We just want to make sure that as this process goes along, we keep in mind that we make sure that EE doesn't become -- I'm sorry, that we don't set the bar so high as to create a barrier to potential participants to the program. We would like to make sure that the standards are not so high and if the incentives are not high enough, the builders won't participate in either the EE or the solar benefits that we are offering here.

That is all I have to say.

PRESIDING MEMBER GEESMAN: Thank you very much. Bob Raymer, CBIA.

MR. HAMMON: May I speak for Bob, he had to leave for the Legislature.

PRESIDING MEMBER GEESMAN: Sure you can, Rob.

MR. HAMMON: I am reading his notes.

MR. TUTT: Now is your opportunity Rob to say whatever you want for Bob.

MR. HAMMON: Thanks, Tim, it is always good to be up here twice. I'll limit myself to Bob's comments. He is concerned about several issues. One is that the time period be 36 months, three years, rather than 24 months. The up

front incentive is critical because what we are doing is bringing in the builder to do this, and not the consumer. So, the incentive needs to be up front in order to make that happen.

He is concerned about the linkage to your EnergyStar because it is problematic, especially in the 2008 and beyond period. He feels that a 15 percent first year incentive is vastly preferable. He feels that the initial starting point for the rebate level is low at $2.25 a Watt. He thinks that within 2007 and 2008, we are looking at a product shortage, and in order to deal with that, the prices are going to be high, continue to be higher than predicted some time ago, and that $2.25 is inadequate to deal with that.

He is concerned about the product certification, just is unaware of what the status of that is. He wonders whether that can be up and ready by the start of the program in January 2007. If not, he is suggesting that there may be a self certification process similar to what was done with NFRC where there was a stage-in process that allowed the certification to happen.

He supports the idea of certification, just doesn't want the program to be held up by the lack of a process.

Looking forward to working with this, and I am

sure he will provide written comments. Thanks.

PRESIDING MEMBER GEESMAN: Thank you very much, Rob. That exhausts my supply of blue cards. Is there anyone else in the audience that cares to address us? Anybody on the phones?

MS. ANTHONY: (Inaudible.)

PRESIDING MEMBER GEESMAN: Sure, come on up.

MS. ANTHONY: I am Juliette Anthony, again, from CARE. I wanted to say that the developments that I have been visiting, the houses are 3,500 to 3,700 square feet. This is not a one-size all fits technology. Usually with the retrofit industry, which I have been working with for five years, you suit the solar system to the size of the home and the expected energy usage. You don't just categorically put 2 KW on every single house because we do have a wide range of developments in this state.

Some are the smaller homes like the 1,600 square foot home, but many of the developments which I have been visiting lately in American Canyon in Vallejo, which is on my way home from Sacramento, these are very large houses. So, I just wanted to clarify that there is a wide range of housing sizes in developments. Thank you.

PRESIDING MEMBER GEESMAN: Sir, come on up.

MR. HAMILTON: Good morning and thank you. My name is Tom Hamilton, I am the Executive Director of CHEERS.

We are one of the HERS providers that Bill had mentioned.

Concerning a third-party verification, a lot of concern about it. Much of it is valid, however, the issue is we are not sure what the protocols are yet on what has to be verified and how you verified. There are a number of programs that are out there that do require some kind of verification for solar, but until the Energy Commission produces something, then we will know the impact of it and certainly similar to the '05 standards, there was a lot of uncertainty if the industry could respond, and we have responded.

Part of our training curriculum is we have modules so that raters could be certified in a particular module, and we have plenty of raters in the state. We currently have over 500 -- I am sorry, 800.

I would support what Rob was saying about the 15 percent and the other percentage level. That makes it much easier, and then that addresses the issue of builders not knowing what homes can go on a lot, but they know if that home is going to be 15 percent or 50 percent, whatever the level is.

Then the last question is an important one or a last comment was about the marketing, is that you have to be able to answer the question of why does a builder want to do this, and through that marketing is create that poll of

ultimately the consumer saying I want this and looking at studies that have now caused the car companies to produce a variety of hybrid vehicles, there is consumer demand, and there was research behind that. Thank you.

PRESIDING MEMBER GEESMAN: Thanks very much. Anyone else? Yes?

MS. HEBERT: Good morning everybody, my name is Elaine Hebert, and I am wearing several hats. I work here at the Energy Commission in the Title 24 office, and I also am a volunteer promoting solar energy and have been doing so for quite a few years through the American Solar Energy Society and local chapters.

A couple of things I haven't heard discussed today, and I don't know if they have been discussed in some other form, but I just want to get it on the record a couple of things. I'll address several different topics here.

Wearing my energy efficiency hat, I am feeling a little bit jealous that there is going to be some amount of verification of the PV systems when I think we still need some work in verification of the energy efficiency side.

I am in a position here at the Commission where I get to hear about Title 24 compliance that is lacking, that plans are submitted to building departments with certain Title 24 levels of efficiency, and then they are not enforced and they are not implemented in the field, and I

have concerns about that, that the energy efficiency side needs to be real, and is there a plan to verify the energy efficiency side, especially if we are going quite a bit beyond Title 24.

I have been listening upstairs on the internet broadcast, so I've been hearing some of the comments. I am concerned about photovoltaic manufacturing capacity over time and supply. I haven't been following that closely, but I have been hearing that there are problems, and I know that some PV companies are planning an expansion of their manufacturing plants, but I am not sure if it is going to be matching what we are expecting to see here in California and how is the availability of silicon and all of that kind of thing.

Are there other PV technologies that are coming around besides silicon, and I am not sure about that, but it is something to consider. Are the efficiencies of PV going to be changing over time, are we making progress in those areas.

I have also been hearing and reading that housing is starting to take a down turn, and I am just bringing up the possibility that our projections for numbers of houses to be built in the future may not meet that same projected increase if the trend we are starting to see right now continues. So, just another thing to put into the

calculations.

I'm concerned for the perspective of building departments who will be having to look at the plans as they come in and plan checkers are not always as aware of energy issues as it is now with Title 24. To have them have to look at now a whole other besides energy efficiency, they will be looking at the solar systems and we will need to work the building departments to make sure that the initial people who look at the plans are up to speed on what they are looking for and can translate that to the other parts of the building department that are involved like the building inspector part.

We have also being some data when we are looking at energy efficiency in roofs and cool roofing, we have been seeing some data that sow that if you have an air gap between the top of the roof deck and the underside of the roofing materials, you get some what of a benefit in energy efficiency. Less heat penetrates into the attic, and, therefore, into the rest of the house. You get some benefit right off the bat just by having an air gap. In some cases, it is only three-eighths of an inch or two and inch and a half, something like that.

With building integrated PV and I've heard some comments where we don't have any ventilation and the roof temperature, the PV temperature might get hotter and be less

efficient. We might look at some kind of ventilation space. I know that Atlantis Energy that has building integrated product has been building with an air gap, at least a couple of years ago when I was following this more closely. I think they did it to keep the PVs more efficient and have that air circulating underneath.

One more thing. In a forum in this very room several months ago, we had a debate about how recent and accurate are the weather files that back up Title 24, and I think we are seeing unusual weather patterns even right now right here with our cloudiness today. Is this a temporary trend, or is there actually, you know, some global climate change happening that will effect our projections of PV production and PV efficiency and that sort of thing.

I note that we weren't planning to update the weather files anytime soon, but it might be something that might become more important if the data from 30 years ago, which I think is what we are using, if the weather has been shifting in that time. So, just something to think about.

PRESIDING MEMBER GEESMAN: Thank you, Elaine. Anyone else? Going once, going twice. I want to thank everybody for your participation. We have held open the docket until Friday, June 16 for additional comments.

Do we have someone on the phone? Fair enough. As I was saying, we do have our docket open until Friday, June

16 for the next round of written comments. I would encourage anyone that feels a desire to comment on any of the discussion here today, to please submit written comments. We have already received a great number of comments that were filed before the workshop.

This is the first of a number that we will have going forward, and I certainly invite you to attend those as well.

We will be adjourned.

(Whereupon, at 11:46 a.m., the workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California energy Commission Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of June, 2006.